

DRAGON USER

International edition

The independent Dragon magazine

95p US\$3.25 September 1985

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word processor**

**The Dragon's ROM —
part one**

Flex revisited

Dragon answers

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How to submit articles

The quality of the material we can publish in
Dragon User each month will, to a very great
extent, depend on the quality of the
discretion that you can make with your
Dragon. The Dragon computer was launched
on to the market with a powerful version of
BASIC, but with very poor documentation.

Articles which are submitted to Dragon
User for publication should not be more than
3000 words long. All submissions should be
typed. Please leave wide margins and a
double space between each line. Programs
should, wherever possible, be computer
printed on plain white paper and be accom-
panied by a tape of the program.

We cannot guarantee to return every
submitted article or program, so please keep
a copy. If you want to have your program
returned you must include a stamped,
addressed envelope.

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The first in a series of articles designed to
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Disk Doctor from Dorian Computing, Bri-
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from A. N. P. Computing, and more.

Numbers Game — Part Two

Pam D'Arcy had so many enquiries about
clamping her disassembler to printers she
just had to produce an article showing how.

Adventure Trail

Mike Garsad brings outdoor to tele-
gamed adventures.

Dragon Answers

Brian Gedge with another session of ques-
tions and answers for Dragon owners all
around the world.

Competition Corner

Gordon Lee produces another brain bog-
gling problem — the prizes this month are
copies of A.N.P. Software's Chuckle Egg
and Screaming Abolish.

Editorial

"OUR INTENTION is to be at the next 6809 Show with a 128K Dragon
running hard disks and Flex."

Fighting words from Ted Corychael — but what do they really mean for
the Dragon owner?

If he can do it, then it means the Dragon is back with a vengeance.

What's more, Eurohard seem to be committed to producing a 128K
Dragon too — though they don't seem too sure whether it should be 6809
or 68000.

Add to this Compuserve's commitment to a hard disk interface, Bepko
disk drives from Rapp and Radolin, new disk formats from Eurohard, the
so called Dragon MSX machine, and sundry developments from indepen-
dent companies, and the Dragon's future begins to take on a rosier hue.

But, at the risk of repeating something that has been said before in this
column, is this what the ordinary Dragon user wants?

If it means that the Dragon 32 is relegated to the cupboard, then there
certainly are a lot of Dragon User readers who won't like it.

Then again, if it means the continued development of new Dragon
machines, compatible with the existing ones, then there are just as many
readers who will be all in favour of it.

Perhaps the single word 'compatibility' is the most important.

Eurohard should take a lesson from Atari and Commodore — the C128
runs Commodore 64 software, giving it thousands of programs even
before its launch, and the 1200X runs Atari 800X, 800 and 400 software.

If a 128K Dragon is produced, then it has to use at least some of the
existing software for the Dragon 32 or 64.

There must be a Dragon 128 — it is the logical next step in the evolution
of the Dragon family of micros. But it should be a progression, not a break
with the past.

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Fantasy Fight

IN REPLY to Mr View's letter in the June issue of Dragon User, I have found a way to increase your lives when playing the game Fantasy Fight by Cable Software. I have also found the memory location for the 35 weapons and also the respective weapons and spells. The memory locations are as follows:

MEMORY LOCATION USE
4H66C7...The number of the screen on which you start.
4H66D6...The number of lives that you start with.
4H47D0...Red keys.
4H47D2...Blue keys.
4H47D3...Bow.
4H47D4...Green keys.
4H47D1...Shield spells.
4H47D2...Lightning bolts.
4H47D3...Sword.
4H47D4...Mace.
4H47D5...Ice rays.
4H47D6...Fire rays.
4H47D7...Emerald rays.
4H47D8...Mail spells.
4H47D9...Arrows.

To use these locations, first load the program and press reset. To gain extra lives type **POKE 4H66D6, plus the number you require**, and poke **4H66C7, plus the number of the screen you wish to start on**. However, on some screens your starting position is directly in the middle of a block, so be careful when using this location. Then type **606C4H66D4**, and the game should run. Pressing reset here performs a warm start instead of a cold start, so **606C** only is required a second time around.

To use the locations for the different spells and so on, some poking of the program must be done, as the program has a routine which clears most of these locations on a new game. First, load the program and press reset as before, then type in the following statements, without a line number.

POKE 4H66D0 TO 4H66D9:POKE 4H47D0 TO 4H47D9:POKE 4H48D0 TO 4H48D9:POKE 4H49D0 TO 4H49D9

I would recommend that you save the program at this point, to give you a changed copy for future use, to do so type

CSAVEFANTASY",
ASCII 4H7D06:4H66D6

Then you can use the locations. As before, poke the location with the number you require.

Before you start, some words of warning. When using the above locations, make sure that the value does not exceed 127 at any point in the game, as otherwise the spell or weapon becomes useless. It is also advisable to only poke the value 1 into the locations that refer to the sword, mace and bow. Also, make sure that the value you poke into the location **4H66D6** is pretty small, say <4H48, as otherwise the program crashes for some unknown reason.

Adam Law
 24 Farnington Road
 Banhill
 Chatterham
 Glastonbury

Printer Control

HAVING just read your review of Printer Control in the August issue I feel I must correct one important point.

The version of the program supplied to your reviewer was only compatible with the Epson 800 graphics type of printer. This version was supplied because this is the most common. However, there are versions for other printers. If a customer does not state his printer type when ordering I ask him for it before despatching the goods in order to ensure he gets a compatible version.

I have versions of the program which drive the 8 pin, 7 data bit types and the 7 pin, 7 data bit wrong way round types. I've even printed a picture with a version driving a serial printer, 8 data bits, with an interface plugged into the cartridge port!

There is also a version which drives a daisy-wheel typewriter or printer. The daisy-wheel cannot produce the graphics but it still gives fast positioning, underlines and access to special characters.

Any reader has only to ask — I will gladly oblige.

William Macdonald
 Macdonald Consultants

Data?

IN YOUR editorial in the June Dragon User on the increasing scarcity of Dragon software you comment on the need for a chain of repair agents. That is commendable, and perhaps Compusergo, the Dragon Importers will do so. There is another aspect of the servicing of Dragons that seems to have had little attention, or none at all: servicing data, test figures and circuit diagrams are most difficult even impossible, to acquire. Undoubtedly your readership includes very many users concerned to do their own servicing, and I would like to suggest that you publish a series of articles and circuit diagrams to help them and to interest others.

John A. Young
 Sheffield 10th

Not so Super?

IT SEEMS much like to hear of other readers' experience with the Super Writer if word processing program. On paper, this is a snail's ahead of any home computer WP program I have used or examined. In practice, I have found mine almost unusable because it crashes with awful regularity, despite willing help from Dragon Data in the past, and Touchmaster more recently.

It has been suggested to me that ROM based programs are more prone to crashes than RAM based ones (ie on tape or disc), though I can't see why. Indeed, what is the BASIC interpreter if not a ROM program, and it's perfectly reliable, as indeed is my Dragon 32 in any other application. It has also been suggested that the program is rather sensitive to mains voltage drops (spike eliminating plugs apparently only protect against voltage crests). If there is anything in this, does anybody know of a gadget to protect against mains voltage dips?

A further suggestion is that there may be a fault in the cartridge connectors in my

computer, which I can't relate as Super Writer is the only cartridge program I have ever used.

Ruben Machefer
 4 Laker Street
 London SW6 6BN

Mnemonic

MANY THANKS, Peter Davis, of Compusergo, for alerting me to the fact that my Disassembler (June issue) contains an incorrect mnemonic. The hex opcode 80 disassembles as LDR instead of the SLOA that it should be. To correct this, load the program into memory and apply the following four **POKEs** to the load address + 2507 (inwards) and re-save the corrected version. For example, if your version loads at 12001 as per the original listing:

LOADADR 12001"
POKE 14535,80
POKE 14535,80
POKE 14540,80
POKE 14541,80
CSAVEFANTASY 12001",12001

My apologies for not spotting this many months ago when I first compiled this table.

Pam D'Arcy
 21 Wycombe Lane
 Wycombe Green
 High Wycombe
 Bucks HP10 0HD

Jigsaw

HAVING read your review of Jigsaw from Videx, I feel that I must put finger to keyboard and express my disagreement at your conclusions. I purchased Jigsaw at the last 6809 show and have had many happy hours trying to complete the puzzles provided with the game.

I agree that the idea of a jigsaw on a computer seems unworkable, but the author has produced a very enjoyable game at a very reasonable price. Although Jigsaw is not everybody's cup of tea, I am sure there are many people who prefer this to the arcade games we have become used to.

Roy Coates
 28 Clevely Road
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Eurohard — plans ahead

Eurohard's Chief of Development Equipment, Jordi Marfany, was on a working holiday in London last month. Between visiting various companies working on Dragon hard and software, he found time to drop into the Dragon User Office.

"The next machine to be launched by Eurohard," Jordi said, "will be a Spanish Dragon — this will be the Dragon 200, but will also be a Dragon 200-E, with possibly a floppyboard built with an 80 column card built in."

Eurohard is also planning the next stage on in the development of the Dragon — "the new machine may be a Dragon with 128K. It may use the 6800, or the 68000 — we have not yet begun the program of development."

nam of development," Jordi added.

On the firmware front, Eurohard has written a new Dragon DOS. "It's a little slower than the old DOS, because we have added a verification routine," he said.

"The new Dragon DOS is in production now. We may be changing or upgrading the EPROMs on old machines, but no final decision has been made on that yet."

Eurohard is also marketing new versions of the Dragon disk drive. "We have double sided 80 tracks, double sided 40 tracks, and a single sided 40 tracks — that's three different types. We will be playing with 5" disks for the time being, but we may go for different formats in future."

Jordi also said that Eurohard has been selling a considerable amount of business software in Spain and in Europe.

He is worried, however, that Dragon users in the UK appear to be losing patience with Eurohard. "Eurohard is trying to get the most for the Dragon, but it takes time to develop new systems. When the development is finished, there will be new machines on the market."

In the meantime, people who have technical queries can contact Jordi at Eurohard in Spain. Write to Señor Jordi Páez Martínez, Jefe del Equipo de Desarrollo, Eurohard SA, C/ta Sevilla-Gipón, Km. 202, Caser de Calientes, Calientes, Spain.

British board

THE OFFICIAL of Compuserve has said that he is "fairly certain that the September machine from Eurohard will be the 128K board we had made up."

"We should have 100 128K upgrade boards ready by the end of August," he said. "Our next project is the hard disk interface."

"Our intention is to be at the next 6800 show with a 128K Dragon running hard copy and Flex," he stated.

Ted would like to hear from Dragon owners throughout the country just what it is they want from the Dragon — "you tell us what you want, and if there is enough demand we'll do it."

DRAGON 200 - E

Dragon's welcome

BOB MORGAN of the Mid Wales Tourist Council has arranged a holiday with a difference for jaded Dragon owners.

Called Bring Your Dragon Home, it's a weekend package at a country house hotel in Mid Wales the last weekend in October.

There will be talks and demonstrations by people working on new developments for the Dragon, and opportunities to get hands on experience with new hardware and software.

"The main aim," Bob says, "is to make Dragon users more positive and to give the machine a bit of publicity."

Bob himself is an enthusiastic Dragon user, and has a Dragon II, dual-disc drives Flex and OS9.

The cost is anticipated to be about £25.00 per person, and anyone interested should contact Bob Morgan, Marketing Information Officer, Mid-Wales Tourist Board, Cathedral Quay, Llynhyr, Machynlleth, Powys SY22 8EE.

Eddy steady go!

EDDY, the hero of Incentive Software's Backtrack, has been busy recently.

First of all there was the final of the Backtrack competition. For all of you who have never seen the game, it involves helping Eddy to escape from various mazes. Those who managed to reach the final screen were eligible to enter a competition — the five best players for Incentive got their inventors a chance to fight it out for a Commodore 5" Disk Drive.

The eventual winner was Barry Ward, of Wokingham, Berkshire. He completed the first two parts of Backtrack in eight minutes, and nine seconds — a total 22 seconds in front of his nearest rival.

Eddy will be making a comeback in Incentive's next Dragon game, Eddy Steady Go! This is a 21 screen arcade game, with over 50 levels of difficulty. It features moving platforms, falling objects, lasers, pits and sea saws.

Eddy Steady Go! will be released at the beginning of October, at £9.95. Contact In-

centive Software, 54 London Street, Reading RG1 4SQ.



Barry Ward

Dumper

MADDOGAN Consultants, which recently released Printer Control for the Dragon, has a new program — Dumper.

Dumper will dump screens to printer, and is a machine code relocatable program which users can incorporate into their own basic or machine code programs, whether on tape or disk. Dumper gives the user the facility to specify what part of the screen desired, and how large the printout is to be.

Like Printer Control, Dumper is available for just about any printer — Maddogan will configure the program for each purchaser's requirements.

Dumper costs £5.00 plus 50p postage and packing, from Maddogan Consultants, 4 Ashton Drive, Caythorpe, N. Nottingham, Leics NG22 3DD.

Flex word processor

THE LATEST program from Compuserve is a new Word Processor for Flex.

It features an interactive spelling checker, an easy to use full screen editor, comprehensive formatting facilities, and a browse

utility which allows users to search for or look at documents on disk while using the word processor program.

Word Processor for Flex costs £75.00 from Compuserve.

Coding the words

Peter Whittaker with a machine code word processor for your Dragon

IF YOU have a printer to go with your Dragon, then it is likely that you have already started to experiment with the potential of your Dragon to edit text for you. As I have to write a lot of essays at college, I have written this wordprocessor program to make the task of essay writing much easier. The main program is configured to run with the Chagral Disk system connected, but by entering the 'Patch', the program can be altered to work with a tape recorder instead. The program resides from \$H014 to \$H1FE, so if it is run without disks, then you must PCL\$ARE before loading and EXECing the program. (If run with disks, then the PCL\$ARE carried out at cold start will protect the program.) Two strong advantages of this program are that all the keys will now auto-repeat, and that the text is printed in green on a black background.

'MENU' Screen

When the program is first EXECed, it will display the MENU screen. This gives access to the save, load, print, and input text routines. Pressing zero <0> calls the EDITOR screen (see below). Pressing

<1> will print out, at a readable rate, everything so far typed into the computer. If the <ENTER> key is held down the listing will pause until the key is released. When the end of the text is reached, the program will automatically go into the text input mode. Pressing either of the vertical arrow keys with the shift also depressed will return to one of the MENU/EDITOR screens. (UP arrow for MENU, Down arrow for EDITOR.) Pressing the <3> while the MENU screen is displayed will put the program straight into text input mode, having first printed the last page of text entered.

Pressing the <3> will send the text to the printer. The program is set up for an 80 column printer, and will print out a 10 character margin, and 70 characters of text. If a word would be split at the end of a line, the program will hold it over for the start of the next line. If you are using a dotmatrix printer, then it is possible to mix double and standard width print on a line. The program is also set up to print 50 lines of text, before printing 10 blanks to pass on to the next sheet. Once the text has all been printed, the program returns to the MENU screen.

Pressing <4> or <5> will call the text save and text load routines. It is important to ensure that the cassette recorder or disk drive is ready for use BEFORE entering the name of the file to be loaded or saved. File names must be eight characters long. After saving text, the program returns to the MENU screen, but after loading new text, the program will print it out to the screen to be read.

'EDITOR' Screen

This bluegreen screen is easily distinguished from the bright yellow of the MENU screen. Pressing <0> will return to the MENU screen. The functions called from this screen involve moving a cursor through the text, to select the points at which the editing is to be done. This cursor will remember its previous position in the text each time it is used. The cursor will remain in the centre of the screen at all times, and the text will scroll underneath it, being directed by the arrow keys. A message is continuously displayed at the top of the screen to remind you just which of the editor functions you have called, and a similar message at the bottom of the screen displays the ASCII code and CHR\$ of the character under the cursor. The up and down arrows move the text up or down one line at a time, whilst the left and right arrows move the text one character to the side. If the arrow keys are used with the shift key depressed, then the vertical arrows move the cursor to the start or end of text, and the left and right arrows find

4582 'WORDPROC' <DISC> MEMORY DUMP.
By PETER WHITTAKER

4115	2455000001010000=	131	4340	2C8000245400040C=	795
4124	00000000245400300=	375	4345	1014270700100000=	635
4132	2454000000000000=	164	4356	00000F21000C72003=	747
4140	00000024540F1014=	409	4364	07400544340000000=	577
4140	0F1020C000000004=	012	4372	43405440002004F40=	575
4156	0701400000000400=	446	4300	20416044200C4540=	402
4164	A7000C0000025F933=	704	4300	544002000000004C=	400
4172	000300F10004400F=	1072	4306	45415345000F4100=	543
4100	0000001000C00005=	002	4404	54000000054455004=	510
4100	0004000F00000000=	773	4412	20044540404F7000=	501
4196	100000000000000F=	1007	4420	534040544544000F=	501
4204	0000001000000005=	1006	4420	1020000F00104100=	030
4212	0000000F00027F00=	049	4430	04020F0000001100=	726
4220	3127100130075001=	557	4444	07000F0040000004=	1091
4220	30102700C2013410=	497	4452	000F000000112000=	940
4236	2702200135102700=	315	4460	3005000107101000=	073
4244	000130102700F020=	029	4460	24540F1010F01017=	030
4252	0700101440F04000=	953	4470	0010100710100000=	740
4260	000010410004000F=	735	4484	0100100700000100=	527
4260	0000002454001F00=	043	4492	1027000001001027=	439
4276	00000432723100010=	000	4500	0020F010100C1014=	562
4284	00013F200C0D1000=	077	4500	2020014020000000=	912
4292	001000000000010F=	923	4510	0120271001212710=	401
4300	1027FF7001001027=	700	4524	012C271201202700=	457
4300	00C00100C7002007=	000	4532	0120270001202700=	457
4314	1000F2000000104=	000	4540	0130270020000000=	533
4324	0004000F00000010=	079	4540	0F1010C01010000F=	010
4332	1430000F0000C2404=	731	4550	00000000000F0107=	703

the start of either the next or the last paragraph (2-4-8(13) — inserted).

Pressing <C> calls the "Delete" test routine. Move the text under the cursor until it is over the first of the letters which are to be deleted. Press the <ENTER> key to mark the spot; this will be acknowledged by a "BEEP". Move the text again, until the cursor is one character past the last letter to be deleted, and press <Enter> again. Once the test has been deleted, the program will return to the EDITOR screen. (If you imagine the program to be cutting real text out of a sheet of real paper, then the scissors would cut along the left-hand edge of the cursor each time the <Enter> is pressed.) Once text has been deleted, it cannot be restored.

Pressing <D> enters the Insert Text mode. Once again the cursor must be positioned over the text by pressing the arrow keys, and then pressing <Enter> to mark the spot. Inserted text will begin from where the cursor is in the text, and the character under the cursor will come after the inserted text. When the <Enter> is pressed, the screen will clear to black, and text can then be typed in. When the <Break> key is pressed, the text will be inserted into the main body of text, and the program will return to the EDITOR screen.

Pressing <M> calls the Move Text routine. This is a combination of the two previous routines. First the cursor is positioned to delete a block of text, and once this has been removed the cursor is

```
10 'HEN LONGER FOR "WORDPROC" MEMO
   Y DUMP, BY PETER WHITTAKER
20 INPUT "START ADDRESS": START
30 INPUT "FINISH ADDRESS": FINISH
40 FOR N=START TO FINISH STEP 9
50 PRINT N: " "
60 TT=9: INPUT AB: Z=9
70 FOR M=1 TO LEN(AB): STEP2
80 L=VAL("5A" + M*(16+AB(N,2)))
90 TT=TT+L: POKEN+Z:L
100 Z=Z+1: NEXT M
110 PRINT " "
120 INPUT T
130 IF T<>TT THEN PRINT "error = ENT
   ER LINE AGAIN": GOTD50
140 NEXT N
```

repositioned to reinsert the block in its new position. Blocks of up to a thousand characters can be moved around using this routine. Pressing <C> calls the Text Copy routine which performs a similar function, but does not delete the text before copying it to some other part of the screen.

Pressing <O> calls the Type Over routine, which enables the correction of single spelling mistakes. The program will at usual display a screen full of text, with the cursor at its centre and as before the text can be moved by pressing the arrow keys. Pressing any other key will change the character under the cursor for that of the key pressed. Pressing <Break> will

exit the routine, and return to the EDITOR screen.

The Search and Swap routine is called by pressing the <S>. This will then prompt you for a word to be searched for. Answer this by entering the incorrectly spelt word, and flash with the <Break>. Then enter the correct spelling of the word, and flash this also with the <Break>. The program will then swap all occurrences of the first word for the second. Be careful, however, for the program is quite happy to make some terrible blunders. For example, if you search for "author" and swap for "writer" the program will also change "authority" to "writery". The only limitation with this function is that it will not swap words of

4564	BC999F5B26FA6810=	500	4812	9CA63410399D9E9F=	913
4572	19816327979C9FBC=	535	4820	A0A6941CFE9D96BC=	1257
4580	999F7995949C9D99=	645	4828	389C9E9FA69A941C=	1829
4588	6FA699819D271C9C=	707	4836	FEDD053F35189FA6=	1119
4596	999F819E2759919F=	559	4844	351819F059999C22=	689
4604	275C9C181C25E991=	763	4852	46494C454E414C45=	577
4612	2827089A9548129E=	575	4860	2E42494E229994D4=	643
4620	9239819F1819A999C=	431	4868	5C18419E94E29F98=	893
4628	9D999F5B192C9B91=	763	4876	999E12618C99E518=	971
4636	4A97192D91382515=	561	4884	9E12F48D133C9E96=	995
4644	6A9B9D999C9C192C=	723	4892	3418399C9C23FA96=	957
4652	58814A97192D9142=	761	4900	941CFE9D9C4672518=	1851
4660	55E57F182C9C1814=	687	4908	9FA99E9E52F0C654=	945
4668	1923FF3916FF99999=	784	4916	99999F191416F0E1=	796
4676	628F181816FF379C=	632	4924	9E9595999999999C=	639
4684	818F181916FF2FC9=	747	4932	28C4899C289C999C=	733
4692	82F718182994C991=	694	4940	A75C9A26FA9C9595=	829
4700	FF1818299C299494=	659	4948	9F9999F09C9C299C=	797
4708	5345525429444593=	574	4956	999C27FA919E2618=	615
4716	4328262842454445=	469	4964	C18E27F39C999C9C=	538
4724	522946494C43294E=	512	4972	29A794391F5928E7=	763
4732	4140459999294144=	518	4980	918D2714C19927DF=	664
4740	CBFF9C293413136=	942	4988	918227D9919C37D7=	795
4748	29C5323534C3FF9C=	985	4996	9D999CA79995C99CF=	955
4756	2934213137299999=	296	5004	9E9C9C9999999997=	953
4764	612346494C454441=	698	5012	A0A626FA9399C99D=	1129
4772	4645222C3933999C=	428	5020	10419E94479F9999=	625
4780	2D41442C39993418=	337	5028	9E1EF28D999E9E94=	1122
4788	98C78D18418E94E2=	991	5036	999F99999E1F959D=	822
4796	9F99999E12618C99=	917	5044	99E9C9999E919E27=	864
4804	55189E129E9C133C=	831	5052	F991312747913227=	755

ly one letter in length. However, the good point is that the search and swap words need not be the same length. It is possible to search for "Peter" and swap for "Fleisch Pal Feed".

Pressing the <S> will display an EDIT screen, and you will have to press the <S> again to leave the program. Pressing any other key will return you to the EDITOR screen. This is to prevent accidental exiting from the program. However, if you do exit the program accidentally, and wish to restart it without losing all your text, then **CTRL-4** instead of the usual **CTRL-142**.

Text Input Mode

Because the print routine takes care of wordwrap and page spacing, there is no need to worry about the end of lines after typing in text. The current type position is marked by a rapidly flashing question mark (?). To delete text, just hold down the <Left Arrow> key, and the cursor will work its way backwards. However, the cursor does not take account of "linefeeds" (**CTRL-13**) as it moves backwards, so if deleting back over a new paragraph, it is wiser to check how far back the cursor has really gone, by pressing <Shift & Up Arrow> to call the MENU screen, and then <2> to display the end of text.

There are several keys with special functions which can be called from the text input mode. The <Shift & C> produces a **CHRG(18)** which is the *Sekolnia* printer code for the © sign. This is so that you do

not have to reset the printer to use "R" for "C". The next key of consequence is the <Shift Right Arrow> which prints **CHRG(14)**, the code for double width print. <Shift Left Arrow> prints <CHRG(16)> for normal width print. The <CHRG(14)> is printed to screen as a RED block, and the **CHRG(16)** as a BLUE.

Pressing the <Clear> key, sets the special character routine. The bottom of the screen will display the code to be inserted at the next print location. This can be changed by pressing the up or down arrow keys. Pressing these with the shift key, will change the code in jumps of 10. Press the <Enter> to select the code displayed. These special keys can be used with the follow functions, to insert text as well.

The final special key to remember is the <Right Arrow>. This calls the "glossary routine". A prompt is printed along the bottom of the screen, and the program waits for an input. Pressing the <C> clears the glossary of all its contents. Pressing the <T> puts you into glossary input mode. The screen will clear to white and wait for you to input the key letter (eg "E"). Then type in the phrase to be called by this letter (eg "Bathological expectations"). Press <Break> to enter the phrase, and the computer will return to the text input mode. The next time you press the <Right Arrow> follow it with <E>, and the computer will add "Bathological expectations" to the end of the text. There is space for a glossary of about a thousand

characters before it will start to overwrite the text memory. Once you have built up a useful glossary, you can remove the program by **CD\ARVUE\WORKPROG**, **30024016.41.42**. Now when the program loads, it will also load in the glossary with it.

One last point, if the Program ID **EDMORT** or **crashes** because you pressed the **RESET** button, then it can be restarted without losing the current text by **ESGCRSH**. Happy typing.

Program Alteration

The margin width is stored at **\$H1917**, and the pointer width-2 is stored at **\$H110F**. The number of lines of text to a sheet is stored at **\$H1221**, and **\$H1233** contains the number of lines including blanks, on a sheet. Location **\$H1030** contains the code stored when the <Shift C> is pressed. It is currently set up to print a "C" on a *Sekolnia* printer. Lastly, if the program keeps returning to the MENU screen, and will not let you enter any more text, this is not a bug! It is because the text memory is full (4000-4500 words), and the text will have to be saved and the memory cleared before typing can continue.

Too much of a Challenge?

If YOU do not relish the task of typing in all this data, then I will be happy to supply a copy on tape (both disk and tape versions), for £2.00 including p&g. 256 Upper Holly Walk, Loxington Spa, Warrickshire CV33 4LP.

5003	7091331927915981=	565	19CC689188895E1=	943
5008	34182781813519=	467	E790188C860925F9=	836
5076	27648861381827FC=	713	86181628C9668F29=	634
5084	6F81361827815781=	634	C8688238C1868828=	921
5032	371027829828C829=	523	8D6C891888889931=	842
5108	454445544F532831=	536	2F188C48825668F7=	433
5108	282844454C453445=	439	84188F8888881F8C=	726
5116	285445588428424C=	531	9C282C88888818D1=	537
5124	4F43488888138B18=	633	7218FF6328454449=	732
5132	8884838D185C8D18=	667	544F52283328284C=	469
5148	888D18C88D18F216=	383	4F564528424C4F4C=	554
5148	FF782845444544F=	783	48284F4628544558=	529
5156	5228322828444633=	462	54887F18288E1588=	432
5164	4552542854455844=	532	188B4828D185C8C=	658
5172	28424C4F4348888=	537	18888D182888182F=	714
5188	1412188884838D18=	429	182F8C18D188888=	1844
5188	5C8D17F88D173181=	867	178D8D1731818C88=	637
5196	8028F88F18248D18=	758	1F88F18248D18828D=	837
5204	7286888D18418884=	792	19888D18F218F245=	886
5212	888F8888888C288D=	782	28454445544F5338=	519
5228	88888188274C1888=	536	3428284F4F58F388=	463
5228	8388188F18228183=	624	424C4F4348284F4C=	544
5236	2731813F27C88138=	884	285445582488F718=	588
5244	27E5818827E18189=	889	188E155418885482=	453
5252	27D8818827F38818C=	668	8D182C8D18888D18=	914
5268	2728811527F813D=	558	3886188A1828F88C=	618
5268	273F8113273FA788=	647	8D1748D81731818C=	788
5276	8D17878D1DE38C18=	828	26F88F18248D1828=	746
5284	18258CBF18288D18=	783	8D18888D18F216FD=	1885
5292	728D18828D188816=	753	F428454445544F52=	731
5296	F8E38D188F28888D=	1226	288728284F564552=	467

5555	22545395845888E15=	530	5544	5428E888888888C18=	768
5556	85188E848888D188C=	640	5552	14255588E1814288C=	742
5557	88D17888817318188C=	778	5553	2388844288888888E=	752
5558	2788818C27888878F=	564	5554	1828388888888888E=	834
5559	18288888C16F18888E=	978	5555	88C24542788888C178F=	521
5556	138C881818878F18=	791	5556	2882888888888888C18=	644
5554	28888C88888884518=	686	5557	8888881888888888E=	758
5552	4348888414844288C=	437	5558	1538818C18142888E=	553
5553	57415888888484E4=	485	5559	8888188888888878E=	931
5558	435288888845413242=	549	5551	188C888888888888F=	1827
5555	48288784F5248888F=	515	5554	8784F8888F182888F=	383
5544	88284848484858288=	444	5552	1818888888888888E=	748
5553	53485884C41434848=	585	5553	88D1878888888888E=	886
5558	434854288574F5244=	573	5554	8888888841838888E=	717
5548	2838F888888888888E=	547	5555	88F888888841CF88E=	1189
5547	27888188C2748888F=	753	5556	8888381888888888E=	791
5554	18278F81481581827=	688	5557	FF8C28843131388E=	682
5552	FF8881152713888E=	774	5558	3822288228888888E24=	396
5558	2713818887178888E=	397	5559	5438F84F8E181418=	688
5555	2784878888888888E=	912	5551	FF43888188848818E=	817
5518	D288888788888888E=	1824	5554	1827FF8888C181428=	634
5524	88878828885881F18=	634	5552	F1381F148F82888E=	946
5532	888888888888813F18=	763	5553	8188C1827FF82888C4=	673
5548	888888888888C188F=	823	5558	5428C82888148F828=	732
5548	88888888F3888888E=	635	5556	188F888888888888E=	1847
5555	184188848888F888E=	562	5554	88818F8888881878=	835
5564	8813878888888888E=	1182	5552	8888888888888888E=	885
5572	888888888888815F88E=	1897	5553	5241438488888888E=	548
5588	888888888888C1427=	778	5558	2882788415348888E=	464
5588	38188F1828888888E=	476	5555	28438F4445888888E=	411
5586	8F888888E1688888E=	837	5554	2828881888E182231=	349
5584	888888888888C16278E=	713	5552	3F18888888888888E=	448
5512	188F1828888243418=	586	5588	18881888F18223884=	523
5588	8888888888888888E=	813	5589	82888F1888815887=	797
5588	8888C181428888188F=	788	5516	8818888188888888E=	791
5586	CC8F182434188188E=	836	5584	882888817888881731=	785
5544	28288888188C1828=	648	5582	8188888888F188488C=	881
5582	28F438188F18288E=	884	5548	1872881731818828=	581
5582	188C8518841888F18=	685	5549	F88F182888F87288=	1813
5588	2488C18888E182418=	518	5555	18248C1828888888E=	388
5575	8888888818888888E=	788	5564	881888188F182488F=	634
5584	881888C182888F638=	734	5572	18288E182488F1828=	535
5582	18288888188871881=	556	5588	388E18241888E1828=	553
5588	8827128188F71881=	481	5589	8888878881888C1814=	881
5585	282712281488888C=	478	5586	22F88F181438888C=	721
5516	3888888888888888E=	387	5584	288C88888881C888=	488
5584	F48888F28F8888888E=	1119	5542	8188C182828F61888=	734
5582	EC888F2888888888E=	1116	5588	1814188C18242713=	358
5588	8188827818888888E=	617	5589	FF818148F18141881=	688
5545	188F182288E182881=	624	5586	888887881888C1824=	881
5554	88827888188273881=	458	5544	28F638F31814F818=	887
5564	8887388815273F81=	583	5552	14388E1824388888E=	587
5572	8887388815F182788=	416	5588	888C1826251588E18=	738
5588	C881381827888881=	814	5589	2418888828888888E=	633
5585	581827888888811518=	518	5576	888C182628F7188F=	893
5584	27888888888188F28=	783	5584	1828888888F871828=	635
5584	88C88188C2454388C=	574	5582	88C1841888488888E=	831
5512	8824488F1828888E=	682	5588	888E18788888888E=	1128
5588	2888888188C181428=	513	5589	8888881978888188C=	883
5588	888E18142888C888E=	921	5516	888888F438288834F=	535
5585	888C245438888E24=	935	5524	5252588C2884488E=	854

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6532	2854455854284255=	548	7828	10882558108F0888=	738
6548	6545455228495328=	511	7829	803885580988627F8=	1175
6549	4844F542828285448=	493	7836	8113F27308128A1827=	558
6556	4154284249472828=	469	7844	81C0813E1827810C=	673
6564	52455455352464946=	631	7852	813C182781278141=	656
6572	47285544F2845444=	508	7868	25E1817828C08E1F=	954
6588	544F5228238288888=	497	7869	5A381FE8888C2302=	1856
6589	8C38188E18248888=	596	7874	8C28C1882878E888=	318
6596	47888C182888F738=	913	7884	F7181C8118162888=	773
6604	34188888883418F7=	789	7892	188E18148C888F788=	963
6612	181888182C8D88888=	628	7188	81882CF8313F188F=	734
6628	81882747188E83E8=	632	7189	18148E181416F513=	548
6639	188F1822815E272E=	565	7116	28444546484E4528=	491
6636	8188272F815F2712=	586	7124	474CF83853418258=	638
6644	81582718818C26C0=	684	7132	8888CF8D18418884=	787
6652	1F8435188F888888=	632	7148	888F88888E18C88C=	897
6668	1838F61816C888F7=	917	7149	88E58E244888F888=	918
6669	18162812F61816C8=	564	7156	8E1FE8381F868827=	819
6676	88F7181628887C18=	475	7164	87818D2738112825=	581
6684	162883781816818=	432	7172	838D1C8D8888C8C=	989
6692	2C28828D188F288D=	815	7188	1FE72CF7F8C8888C4=	1883
6708	8888E18F88888E88=	1823	7189	1FC18828C8FC8888=	874
6788	341838888888F8F8=	597	7196	C3888CF8D88882805=	832
6714	48841CF88C888C85=	1827	7204	8C1FE72C888C8888=	878
6724	188F863888722538=	738	7212	C488C388888C8888=	1834
6732	454349414C284348=	521	7228	1888C3888313F188C=	781
6748	4153414354455228=	546	7229	888828F88D1C8C88=	761
6749	434F4445283C2238=	469	7236	888C888C882F8888=	955
6756	FF8C283431513828=	682	7244	8C88CF8C8888C288=	879
6764	3822282C8888888=	542	7252	8885288C883F288=	988
6772	341838888888F8F8=	597	7268	34221888888188C=	584
6788	86841CF88888888=	1162	7269	88E8251C3188E818=	745
6789	188F863888231388=	785	7276	8F8888188E842888=	687
6796	2C318888F88D1841=	782	7284	88884788188C8888=	912
6804	8884288F88888E1F=	684	7292	28F83828388D1A72=	755
6812	C88D88858E84888F=	1295	7308	FC88884C88C38828=	1835
6828	88888E1F888C888=	1856	7328	FC88888D1C8C8888=	1815
6829	8888E18F88888E1F=	872	7316	8627F881831827F4=	727
6836	C78D88858C8888881=	1213	7324	428E1FE7F888D88=	1138
6844	8827F88135278216=	534	7332	8C882F8D888C88CF=	863
6852	F8C88CF88F814888=	1239	7348	8C888C8D8888627F8=	342
6868	8F8D1841388D8888=	793	7349	8C1C5C8183272881=	658
6869	8188182782841888=	492	7356	883272F81888273181=	453
6876	83E8188F1822815F=	716	7364	51357518113274581=	688
6884	1827F56481581827=	675	7372	5F37E881581827FF=	888
6892	F888818818278288=	749	7388	88818827C8818C27=	789
6898	81832708818C2737=	623	7389	438F88888888C28C8=	926
6908	81152727815C2727=	508	7396	84888F8888F1FE718=	984
6916	81832761818827C5=	684	7404	F3F1A7888888828E8=	1349
6924	8113271F8E18148C=	549	7412	381F888427E83418=	718
6932	7D881827F53284F8=	778	7428	8E8888381F8F8888=	732
6948	8F18148C1584F8F=	868	7429	86CF8888C88F8888=	997
6949	842888888F28E588=	878	7436	32182888F888F888=	784
6956	8E28E1888888C888=	1832	7444	868F38CF8888F888=	983
6964	18CC8888188888E1=	879	7452	868F2888F818CC87=	1133
6972	8788188C8888C888=	774	7468	88888F288888CF8D=	1165
6988	86181628C7283F3C=	687	7469	18418E84C88F8888=	754
6989	4445484848455288=	581	7476	8E1D448D8883881F=	888
6996	38438C4841532827=	491	7484	8C888828F918F388=	847
7004	484558273D88883=	567	7492	28474C4F53834152=	571
7012	41534528888E1849=	491	7508	582846384C4C8888=	562

FLEX revisited

Roy Coates takes another look at the new official Dragon operating system, FLEX

HOW THAT Elseward has decided to drop OS9 in favour of FLEX as the official Dragon operating system, it is worth taking a look at just what FLEX is.

FLEX first appeared in 1977 and was written by an American company called Technical Systems Consultants Incorporated.

It has been run on a variety of 6800 and 6809 based machines in all sorts of environments and for all sorts of different purposes. The FLEX used for this review is a custom version written for the Dragon by the London based firm Compuserve and they have added a few features to make life a little more comfortable. These include a modified 31 by 24 screen display using MODEC 4 graphics which is a marvellous improvement over the standard 32 by 16 Dragon display.

Machine code chunk

FLEX is an 8K chunk of machine code residing in RAM which handles all the disk and terminal I/O. All the usual DOS commands such as CAT, LST, SAVE and so on are stored on disk and are only loaded into RAM when they are required. This is the way in which most of the expensive 'real' computers work and is obviously very efficient when it comes to saving valuable memory. One of the big attractions of FLEX for me is that FLEX is a very 'open' system. By that I mean that the documentation giving the entry points to all the routines contained within FLEX and all of the useful locations used by FLEX is readily available in the FLEX Advanced Programming Guide. I don't think that you need to be an advanced programmer to deal with FLEX, as most of the things you would want to do have already been done for you. The routines available within FLEX include all possible disk operations, text operations such as input a character or number, output a character or number, print a string and many more. Even the error handling is extremely simple and all these functions are very well documented.

Getting FLEX started is simplicity itself. Simply type 00001 for the Dragonica version, or 00001 FLEX for the Costa DOS version, and within a few seconds the H-Pass (31) column screen will appear with the FLEX copyright line at the top. You will be prompted for the current date. When entered, the FLEX prompt 'h>' will now appear and the system is ready for use. FLEX is very user friendly — it is difficult to make mistakes as any command which may delete a file or disk asks you twice if you are certain that you wish the operation to continue. An example of this is the DELETE a file command.

```
delete jetset.bin
DELETE JETSET.BIN ? y
ARE YOU SURE (Y or N) ? n
AH! I THOUGHT SO.
```

A FLEX file specification consists of the filename which may be up to eight characters in length, followed by a three character 'filetype'. For example:

```
DATABASE.BIN is a machine code file.
MYPROG.TXT is a standard FLEX
test file.
MYPROG.BAK is a backup file
created by the editor.
```

As well as the file name and type, other information pertaining to the file is stored, such as the date of creation and the file protection allocated to it. The files may be

delete protected, write protected or catalogue protected so that they do not appear to exist on the disk at all. This last option may seem a little strange but I for one have found a use for it when running FLEX on a single drive system. If all of the system's utilities are catalogue protected, then the system becomes 'transparent' and the disk appears to contain only your own files which is obviously easier and far easier to work with. The minimum hardware required to run FLEX using either a Costa or Dragonica cartridge is a Dragon 64 and at least one disk drive. Alternatively a Dragon 32 may be used in conjunction with the excellent and much unpublicised PLUS cartridge available from Andcock Data Design.

Contents of the FLEX system disk

APPEND	Concatenates two or more files.
ASMB	TSC 6809 Assembler.
ASH	Defines which disk drives are systems and which are work drives.
BACKUP	Creates a security copy of a disk.
BAUD	Sets the BAUD rate at which the Dragon's serial port may be used.
BUILD	is used to create text files.
CAT	Catalogues the contents of a disk.
COPY	Copies files from disk to disk.
CS	This file holds the data used for the character set used in the H-Pass display. Eight different styles of character set are supplied.
DATE	is used to set or display the current date.
DELETE	Deletes the specified files from a disk.
DRIVES	is used to tell FLEX how many disk drives are connected to the system.
EDIT	'TSC' Standard Text Editor.
EXEC	A list of FLEX commands may be stored in a normal text file and the list executed using the EXEC command.
FLEX.SYS	This is the 'sine' of the FLEX system and is copied into RAM when the system is loaded.
H	This prevents execution of the specified command until a key is pressed so that, for example, disks may be changed.
I	All input for a specified command is taken from a specified input file.
JUMP	Passes control to a machine code program at a specified address.
LINK	is used when creating a FLEX system disk.
LST	Lists a specified text file.
NEWDISK	This utility formats a blank disk for use with FLEX.
O	Re-directs all output from a specified task to a specified file.
P	Re-directs the output from the specified task to the printer.
PROT	Changes the protection of a specified file.
RENAME	is used to change the filename of a file.
S	Re-directs all output from a specified job to the Dragons serial port.
SAVE	Saves a specified section of the Dragons memory to disk.
SDC	is 'single disk copy' and allows files to be copied from one disk to another on a system with only one disk drive.
STEP	Allows the user to define the step rate for their disk drives.
TTYSET	This utility is used to set terminal attributes if using something other than the Dragon as a terminal.
VERIFY	Switches the verify option on or off when saving or loading a disk file.
VERSION	informs the user of the version of a specified utility.
XXOUT	Deletes all files having the extension GUT.

The FLEX system disk supplied by Compuserve contains all sorts of useful goodies. Everything you would need to use the system is contained on the disk. There are also two special utilities provided — the text editor and the assembler. The text editor is line oriented and is a very powerful one. The assembler must be the most powerful that I ever seen. Just about every feature you could want from an assembler is included.

One really useful facility is Library which gives you the ability to call other source files from within your main source file and have them included in the assembly. For example, I have a file called FLEXLINK.TXT on my system disk which contains a list of all the FLEX routines and their addresses so that whenever I am writing a program which is to be linked to FLEX I simply add the line

LIB FLEXLINK.TXT

to my source file and the equates stored in that file are automatically included in my assembly. This means that my program can use FLEX calls such as

JSR @PTRNG

which prints a string of text to the terminal, with no need to define the entry point of the routine @PTRNG.

Once FLEX has been loaded on a standard Dragon 64, the user is left with RAM from 0 to \$BFFF completely free for their own programs. Although the Dragons BASIC is not immediately available when FLEX is installed, a modified version called DBASIC is available on disk which has



links through to the FLEX system to give access to disk files as well as the ability to pass commands to FLEX itself. The DBASIC package also gives use of the 512K colour display which is a great improvement over the standard Dragon display. Other versions of BASIC are also available for FLEX. So are 'C', C++, Pascal and many other languages. There are also many utilities available including Word processors, Text processors, Spreadsheets, Data-base systems, Assemblers and cross-assemblers, De-bugging programs, and the list is growing all the time.

In conclusion, after many months of using FLEX I don't know how I ever managed without it. FLEX expands the capabilities of the Dragon by an incredible

amount, something that cannot be done with most of the other home micros. Buzhardt has settled on FLEX as their standard operating system and Compuserve, the official Dragon importer, has been heavily involved with FLEX for many years and is continuously updating the range of software for it. For anyone put off by the price, you are getting an awful lot of software for your money and I think you have more chance of being run over by Gorrath than of regretting the purchase of FLEX. If I had my way, FLEX would be compulsory for every Dragon owner. Compuserve FLEX operating system, editor and assembler with DBASIC package ... £99.95. FLEX Advanced programmers guide ... £11.95.

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THE DRAGON's ROM contains 18K of machine code routines for handling the screen, keyboard, graphics, and sound necessary for Microsoft Basic. Many of these routines are extremely useful for the machine code programmer, and some can even be used directly from Basic.

To use a "firmware" (ROM) routine in your own programs, it is necessary to know several pieces of information. Obviously, the entry address is required, but also any special entry requirements, such as registers and memory locations which must be set up, and the exit conditions of the routine.

This new series of articles will tell you all you ever wanted to know about the inner workings of the Dragon. Every useful ROM routine is given as well as a complete memory map of locations used. Each aspect of the firmware will be considered individually, starting this month with the cassette handling firmware. Anyone writing assembly programs with any save/load options (such as adventure games, word processors, databases and the like) will find all the relevant information here. Many of the locations given can also be PEEKed (and POKEd) by the Basic programmer to enhance a Basic program.

Each section will take the form of a memory map showing all the useful locations which are used by the routines documented, followed by the firmware routine entry points and notes. Wherever possible, the Randy CoCo (extended Basic 1.1) routine address will also be given in brackets. Generally the routines are identical on the two machines, differing only by the position in the ROM.

By the end of the series you will have a complete "firmware manual" for your Dragon computer.

The Cassette Operating System

The Cassette Operating System (COS) routines deal with reading and writing files to tape. The various levels of the system allow reading and writing on the character by character, block by block, or whole file basis. Output is via the 6 bit D/A converter and input via an input zero crossing detector. The cassette interface operates at approximately 1500 baud (about 190 characters per second).

A standard Dragon file is made up of the following sections on tape:

- 1 A leader of bytes of value \$55 (normally 128)
- 2 A filename block
- 3 A 0.5 second gap of tape
- 4 Another leader of value \$55
- 5 One or more blocks of data

- 6 An End of file block
Each block consists of the following:
1 A leader byte of \$55
- 2 A Sync byte of \$2C
- 3 Block type byte
- 4 Block length byte (0-255)
- 5 Data bytes (up to 255)
- 6 Checksum byte
- 7 A trailer byte of \$55.

The block type byte signals the type of information in the block. 0 = Filename block, 1 = Data block, \$55 = End of File marker block. The checksum byte is calculated by summing items 3, 4 and 5 together. This is used to detect CRC errors.

The Filename block is a special type of data block found at the start of all files. It is 18 bytes long and contains the following information:

- 1 Eight characters for the filename
- 2 A file type byte
- 3 An ASCII flag byte
- 4 A gap flag byte
- 5 Two bytes for the start address of machine code
- 6 Two bytes for the entry address of machine code

The file type byte signals the type of file which follows: 0 = formatted basic, 1 = ASCII data, 3 = binary. The ASCII flag byte is zero for binary files, non-zero for ASCII files. Finally, the Gap flag byte takes the value 1 for a continuous file, and \$55 for a file with start/stop gaps.

COS Memory Map

The following locations are those used by the cassette operating system. Most are set up before calling one of the COS routines. Some, such as the status byte, start address and error code, can be usefully PEEKed from Basic. All addresses are given in decimal. Where two consecutive locations are given, the value is 16 bit with MSB first.

- 116 Cassette I/O flag. This has the value \$55 when cassette input or output is taking place.
- 117 End of file flag. After a block is read, this location signals the end of file has been reached if it is set to non-zero. (This is the location used by the GOF (-) command in Basic.)
- 120 Cassette Status Byte. This can take three values. 0 means the cassette stream is closed, 1 means the stream is open for input, and 2 means it is open for output. This location can be peeked from basic to avoid both 'NO' and 'AO' errors from occurring.
- 121 I/O buffer size.
- 122-123 Header (buffer) address, the address of the filename block in memory. Set up internally.
- 124 Cassette Block Type. This is taken from the start of the block just read and is as detailed above.

- 125 Cassette Block Length. This is the number of bytes which have been read, or are to be written.
- 126-127 Cassette I/O buffer address. This contains the address of where to put a block of data read, or from where a block of data is to be written.
- 128 Used internally for calculating the checksum.
- 129 I/O error code. This contains a code relating to the cause of the error. 0 = No error, 1 = CRC (checksum) error, 2 = attempted to load into an area where there was not RAM.
- 130-132 Temporary locations used by the COS internally.
- 144-145 Cassette Leader byte count. This is the number of bytes of \$55 output as the leader. This is normally set to 128, but can be POKEd to a larger value if you suffer from repeated I/O errors caused by over-sensitive ALC cassette recorders.
- 146-150 Motor On delay. When the cassette motor on routine is called it performs a delay loop before returning; this is effectively the length of the interblock gap in data files. The 16 bit value in these locations are used for the size of the delay loop. Initially, this is set to be about 0.5 seconds; again, this can be changed to a larger value for cassette recorders which take a while to reach full speed.
- 465 Length of the Filename. This is the number of significant characters in the filename, and can range from zero to eight.
- 466-473 Cassette filename to search for, or to write out.
- 474-726 COS default I/O buffer. This is an area of memory used to load the filename block and ASCII data blocks into, if it contains a filename block, then the following locations can be peeked:
474-481 Filename of file found
482 File Type Byte (see tape format information)
483 ASCII flag byte (see tape format information)
484 Gap flag byte (see tape format information)
485-486 16 bit entry address for mic code programs
487-488 16 bit load address for mic code programs

The following locations are different for the Tandy COCO machine:

- 128-130 Motor On delay. The details are as for locations 146-150 above.
- 146-147 Cassette leader byte count. Details as for locations 144-145 above.

Next month, we conclude our look at the cassette operating system with a list of all the relevant firmware routines and their entry and exit conditions.

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Rule Britannia

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It's refreshing to see that small software houses can still produce good material for the Dragon, and Keydata has put a lot of effort into this strategy game which asks you not to rule the world, but merely try to run Britain between the years 410 and 580 AD.

It's a familiar theme, and one that's easy to do badly, but here you sit up from the start when a suitably grand piece of music is played from the cassette through the T's speaker to get you into the mood for the game. It's a nice touch, but would have been nicer if we didn't have to listen to it through the screeching data loading.

Never mind, once loaded you're given the option of assuming a saved game, and asked if you wish to make use of the high-speed poke. My machine won't cope with this, but even without it the responses were fast enough. The story is that the Roman legions have had to withdraw from the country, leaving 34 regions in England and Wales to fend for themselves against the marauding hordes of Saxons, Picts, Gauls and Scots. A numbered map is given for reference on the cassette insert, with a highway display available to show you how

you're faring against the enemy.

Each province is capable of carrying various numbers of infantry, cavalry, mercenaries and so on, and the strategy problems aren't of feeding the population or growing produce, but mainly mobilising troops to defend different areas under attack. You have to act quickly and hire troops in the various coastal provinces, as the Gauls in the south and the Scots in the north will start trying to make inroads at once, and if they seize a province you'll have to move troops from elsewhere to try to retake it.

The single-letter commands (also listed on the insert) allow you to send out scouts, attack and counter-attack, plead with Rome for help and so on: 13 possible commands in all. Apart from using troops, you can strengthen your provinces by putting up buildings, though naturally this eats into the old kitty.

There are one or two minor limitations, such as the amount of information you have to sit through and try to take in at the end of each year when the reckoning's done, but that's no great drawback and it, for instance, you enjoyed Dragon Data's Viking then you should give Britannia a try too.

Mark Garsrud



Screaming Abdabs

Program: Screaming Abdabs, A & F Software, Canal Side Buxton, Woodbine Street East, Rochdale OL16 5UB
Price: £3.95

If A & F Software continue at this rate they could very easily become a top Dragon software house. First, the excellent Chuckle Eggs, and now this superb Mantic Miner clone.

The Mantic Miner type of game is one of my favourites thus giving this game a distinct advantage. However, even those who mock this software breed will not be able to deny that this is an excellent im-

aged and executed game.

As has been said, it's a Miner clone, consisting of 35 very complex screens, each more challenging than you are at first led to expect, and to negotiate these screens you get five lives plus a bonus life of 5,000 points.

There is an option for keyboard or joystick, one to four players, and, although undocumented, pressing 'r' changes the colour set.

There is a pause facility but for some inexplicable reason it seems not to work when playing the game in keyboard

Reeling About

Program: Bandito, Pocket Money Software, 41 Tuxo Road, St Austell, Cornwall
Price: £1.99

LET ME declare my prejudice right from the start and say that I've always thought one-arm bandit simulations to be just about the most useless use for a home computer, only marginally more interesting than using one as a door-stop.

That said, Bandito is reasonably well done, starting with optional instructions (well, you've got to know how to rotate the



reels, haven't you?) and giving you a stake of £1, with each turn costing you 10p. The highest prize you can win is £3, though I was hard pressed just to stay in credit.

The program includes a HOLD feature, and also a GAMBLE or COLLECT option if you manage a winning line.

GAMBLE means you can multiply your winnings if you stop an arrow at a particular point on a scale.

You may also HUDGE from time to time, though both nudges and holds came up rather too infrequently for my liking. Pressing the space bar 10 times in a row with no wins, no holds and no nudges is hardly a thrilling experience.

Bandito's best feature is the graphics, which sound very smoothly indeed, but even at £1.99 I wouldn't be gambling my pocket money on this one.

Mike Garsrud



mode.

The most interesting feature built into the game is the "Randomizer" mode which, when selected, will pick any of the 35 screens, at random, for the player's enjoyment (5).

The graphics are superb; if the screen looks cluttered at times it is due to the complexity of the game.

This game not only features moving and collapsing platforms, it also has electric walls, teleporters, moving beams (a la Donkey Kong '87), switches, and the usual run-of-the-mill objects turned mutant (yet have screens, televisions, no telebs — really — and screens to come but a few) but they move in two dimensions — they move up and down as well as left and right.

The unclear instructions do not tell you that you have to

collect all the food on a given screen before you can collect the key and finish the screen; rather they imply that you can collect the key at any time.

This game, apart from the very small niggles above, is flawless, it looks good (even the loading is great once you realise that the computer is not actually crashing — it's meant to load that way!). And what's more it plays fairly which means no collisions are registered unless they actually take place on screen (regular players of Jet-Set Willy will know what I mean) and plays very well.

This is yet another one for the collection — unless, of course, you hate Mantic Miner. I wholeheartedly recommend it.

Jason Orbaum



Assembly points

Program: *Altream, Grovcon*
Software: 32 (Grovcon)
Model: 32000
Price: £12.95

A FREQUENTLY asked question is "Which assembler package should I buy?" One of the best and most popular is due for the Dragon has been the Dream range. This was originally marketed by Dragon Data as *Altream* on cartridge and in two parts, *Dream* and *Dreambug* on cassette. Since the demise of Dragon Data the authors, Grovcon Software, have taken over the marketing and are now offering *Altream* on a single cassette, cartridge or Dragonsoft disk.

The cassette version of *Altream* is reviewed here. The manual supplied is extremely well written and produced. It seems to be well-forecasted identical to that produced by Dragon Data, but at least Grovcon have made it a decent size (Dragon Data's manual was only four inches by three inches). There are plenty of examples sprinkled throughout the text with the mandatory program to fill the screen with a particular character — why do all assembler manuals have to include this program?

Altream is designed to be co-resident with Basic programs and is loaded into reserved RAM after issuing a CLEAR statement. The lower HIMEM is set, the more space you get for the assembly language text. The first section of *Altream* that faces you is the screen editor. *Dream* does not use line numbers at all, and the editing commands are quite different from the Basic line editor. All the keyboard characters now have autotyped and the caps-lock works backwards, which means that shift+A gives lowercase "a".

The cursor can be moved to any part of the text by using the arrowed keys. Moving off the top or bottom of the screen causes it to scroll up or down, and using shift and an arrowed key gives a much faster scroll for quickly locating text.

Assembly language commands are typed one per line and can be entered, if desired, with each 'field' tabbed to the

correct column to make the program easier to read, or just typed normally to save tabbing. Inserting characters is very easily done: shift+right arrow shuffles the characters to the right of the cursor along to make space. There is, however, no automatic wrapping of text to the next line, so characters shifted off the end of the line are lost.

The Dream editor also has a number of commands which are all preceded by the Break key. For example, Break-I will insert a blank line ready for more text, and Break-Finding will find the first occurrence of 'going' after the cursor. Whole blocks of text can also be marked and copied, moved or deleted. Once the text is completed it can be saved to cassette using the Break-S command. Cassette files can also be merged and printed.

The program is assembled using the Break-A command. *Dream* allows labels of up to six significant characters. During the second pass, a listing of the assembled program is output, showing the address, op-codes and mnemonic. Errors are given as one letter codes and the listing stops at an error until a key is pressed. The listing can also be passed by pressing Break-, and printed again by pressing 'B'.

A new set of commands is now available, selected once again by the Break key. Break-F points out an assembly listing of the program, and Break-X will run the program just assembled from the beginning, or from the address of a special label starting with an 'X' character. A nice feature of the assembler is the PUT directive, which allows programs to be assembled to run at one address, but to be stored at another. Useful if you want programs which will run where *Dream* is located.

The Break-G command takes you into the third section of the *Altream* package, the *Dreambug* monitor program. Again, all commands are one letter long and are followed by one or more parameters. Numbers may be entered as either decimal or hex.

Dreambug allows a number of breakpoints to be added into your program. These allow the program to run normally until the breakpoint

address is reached. Control is then passed to *Dreambug* which will display a list of the CPU register contents and the next command to be executed. Up to 16 breakpoints are allowed and these are automatically reset when the program ends.

Another method of testing programs is using the tracing facilities at *Dreambug*. The 8000 op/c operation is restricted by the tracer which can execute single instructions and display the op/c register contents between each. Alternatively, instructions can be executed a set number of times, or until the contents of a memory address change. Single stepping is a very powerful tool for debugging programs and is particularly well implemented in *Dreambug*.

As an overall package *Altream* is hard to fault. The editor is a joy to use and makes Basic's line-editor look feeble. The assembler supports all the instructions and addressing modes of the 68000 (certain other popular assemblers do not). The disk version of *Altream* (called *Chickadee*) looks even better, allowing assembly to and from disk, giving the potential for saving programs to be assembled. If I had to find fault with *Altream* it would be that it only allows lines to be 32 characters wide, which leaves only a few characters for comments, and the fact that there are no built-in commands for saving binary code (assembled programs) to tape, although this is quite possible using CASATM from Basic.

For the *Altream*, *Dreambug*, or Dragon Data *Dream* owner, Grovcon Software have now released a program called *Dreampt*. This is a program written in Basic which gives *Dream* test files to be printed out on 84 character wide lines.

The idea behind *Dreampt* is that the *Dream* editor is so good it could be called a simple word processor, so text is prepared using this and then printed out by loading in *Dreampt*. The program takes every two lines of text and printed them as one, there is no formatting or right justification available, although this could have easily been implemented within the Basic program.

The program allows a number of characters to be sent to

the printer before printing and at the start of each line, for example, the 'tab' character would be useful on 80 column printers.

Dreampt does not make *Dream* a real 'wordprocessor', but it is ideal for anyone who already owns a package including *Dream* and who wants to use it to prepare simple documents, such as letters or memos. Even at £4.99 *Dreampt* seems a little expensive for a program written entirely in Basic, but it is a useful addition to the *Dream* range.

Steve Cudge

Slide

Program: *Slide, Pocket Money*
Software: 41 (Turo)
Model: 32000
Price: £1.99

SLIDE turns your TV screen into one of those pocket puzzles where you have to push pieces around in order to reform a picture or sequence of letters or numbers. In each of the three puzzles there is naturally one blank space to help you in this, otherwise the game would be a complete non-starter. Mind you, it's not much of a starter as it is. You use the arrow keys to move the blank piece round the board — a quite logical arrangement whereby the down arrow moves it up and the left arrow moves it right, and so on.

Each puzzle is a six by seven grid, graded for difficulty, the easiest being a straightforward sequence of numbers, next easiest hexadecimal numbers from one to 26, and hardest is a map of the good old USA. Pressing 'H' at any time will show you the correct solution, and this stops on the screen for as long as you care to keep it there.

I find this type of puzzle exceedingly tedious, and because of this quickly retired one glaring fault, which is that you can't quit a game in choose another option. You have to reload or risk your back with the reset button. Even if you like this type of game, it would seem easier to me to try the real pocket variety, much nearer than *Dragon*, tape deck and YDU, which I find tend to make my pockets bulge somewhat.

Mike Gerrard



Domino doctors disks

Program: Disk Doctor, 102 Priority Avenue, Taunton, Somerset TA1 1TB
Price: £19.40

DRAGONDOCS is as reliable as any other 5^{1/4} disk system, but disks do get corrupted, especially if you are prone to spilling coffee all over them! So you have your treasured program on a disk which has just fallen in the milk drain, and you've forgotten to make a backup up of the disk. Trying to run the program just gets you an TRF error — what do you do? Answer, get the Doctor — well the Disk Doctor anyway.

The first real Disk Doctor program I have seen for DragonDOS is from Domino Computing. This is supplied on two double sided disks which can be inserted either way up, giving you a total of four copies of the program. The 'router' sided disks are really just single sided disks with the write protect notch and index hole punched out so that the unprotected side of the disk can be read.

The purpose of all this is because the Disk Doctor disk cannot be copied because some of the sectors have been formatted in a format unknown to DragonDOS, so the Backup command fails. Unfortunately, there are so many sticky labels all over the disk that it frequently got stuck in my drive and had to be pried out!

The software is a mixture of protected basic and machine code routines. As well as the Disk Doctor itself, there are a number of utilities offered. For example, all the 'lost' files can be restored providing no new information has been put on the disk since the files were erased. The files appear as NAME.101, NAME.102 and so on in the directory.

Another option allows you to view the files, which are flagged as being erased from the disk, but are still in the directory. Output can be sent to the screen or printer. All the files on a disk can have the protection bit set or cleared in one go using the Protection option.

One of the least useful utilities is to send a directory listing to the printer, that is a DIR to printer rather than screen. What's wrong with PCORE 111.254-DIR I want to know? A much more useful utility

gives full information on all entries on the directory track. The name, type, start and end sectors addresses are displayed, together with the track and sector numbers used by the file.

DragonDOS owners have probably found for themselves that you can save a program to disk with no name as in SAVE "", but you cannot list it, or rename it. Another of the utilities on this disk will rename all nullnamed files to D0M1N0C1, D0M1M02 etc, so that you can rename them or list them.

The final utility will verify all tracks and sectors of a disk, reporting faulty ones. It does this simply by using the SPREAD command and trapping disk errors.

Some of these utilities will probably be of use to most users from time to time, although most could easily be written yourself given the DragonDOS Programmer's Guidebook. However, what makes this disk worthwhile is the Disk Doctor program.

This is fully automated, and works basically as follows: the program attempts to read through the corrupted disk, noting which sectors cannot be read. It then checks through the directory and finds which files use the corrupted sectors. These sectors are replaced with clean ones containing R&M statements on the 'repaired' disk.

The program is not 100 per cent successful at restoring damaged disks, but performed very well on my few corrupted disks. Disk Doctor and its Utilities will work with either a single or double drive system. You are asked how many drives you have at the beginning of the program. Interestingly, the program will not perform operations on itself!

If not for a couple of minus points I would suggest that Disk Doctor is a valuable must for all DragonDOS owners. However, the price is not realistic at £19.40. The 'double sided' method makes a mess of the disks the program is supplied on, and the manual is not up to much at all. However, the manual I saw was only a draft version, so perhaps it will be transformed into something decent for the production copy.

Disk Doctor is a very useful and well written program which will be generally useful to users. If you can't justify the cost then I recommend it. A Delta Dos version of the program should be available shortly.

Brian Cadge



Robin's no robbery

Program: Robin Hood, Pocket Money Software, 41 Truro Road, St Austell, Cornwall.
Price: £1.99

OUT OF the recent batch of Pocket Money releases, Robin Hood was one of my favourites, one of the few I'd actually go out and buy. Okay, so it's an inferior version of The King, but it's still great fun to play and has many amusing touches about it. Instead of rescuing the blonde started from the clutches of the bitter galleys, you're rescuing Maid Marion from the clutches of Nottingham's castle. Instead of barrels, you'll be bowled over by boulders.



which the evil Sheriff tries to drop on your head from the ramparts at the top of the screen. He does follow your movements left and right before dropping the rock, and while that's not too much of a problem when you're way down at the bottom, it creates a bit of bother as you climb up.

Rather than a continual pathway with ladders, this is a platform-type screen, with Robin having to leap from place to place, trying to avoid a fall through to the moat beneath, and trying also to pick up the bags of gold and arrows for bonus points, and the key that you'll need to release the malicious Marion. The top level of platforms also has several arrows ringing the way across, just to add to the problems, though if you do

get to Marion (all right, so I don't), there's then a bonus screen.

Beyond that, I don't know. But while I'm sure it won't have the complexity of The King or Maid Marion, at £1.99 Robin's nothing to sneeze at.

Mike Garsent



The pits?

Program: Pit Fiend, Pocket Money Software, 41 Truro Road, St Austell, Cornwall.
Price: £1.99

CAN YOU go your wits down the pits and collect together the nine pieces of a broken shield that have been scattered around the five different levels of the dungeon depths? You use the arrow keys to move your man round the maze (corridors through brick-like structures), with the 'V' and 'D' keys to move up or down a level provided you're standing on one of the appropriate staircases that link the different levels. Move over a bit of the shield and it's fixed in on the mini-shield at the foot of the screen.

You start with three lives, and as in Mordred games of pit you can choose from three different coloured screens, though anyone choosing the buff screen will need their eyes testing, after-



wants if not before. A supply of oxygen is running out at the right of the screen, while you also have to contend with the pit fiends the mummies, Pacman-like ghosts which roam the corridors. Your defence against these is to bash the space bar to send a spinning knife in the direction you're facing. Or it may be a screaming, as it does come bouncing back to you.

The main plots round the corridors well enough, and the game is quite tricky without exactly having me coming back for more. *Pit Fiend* is about average among these recent Pocket Money releases, more or less what I expected the £1.99 range to provide. Okay, but not worth a full price release.

 Mike Gerrard

Money, money

Program: Daybook, Cashbook, Sales and Purchase Ledgers, Software Design, 58 Woodroff, Goslar, Huddersfield, West Yorkshire.
Price: £14.95

SOFTWARE Design has released a suite of accounts programs for the cassette-based Dragon 32 and 64. The software consists of three cassettes, one for Daybook, one for Cashbook, and one for Sales and Purchase Ledgers. The author has provided separate versions for 32K and 64K machines on either side of the cassettes, rather than testing how much memory is available from within the program, presumably to save memory. Indeed the whole philosophy behind this software seems to be memory conservation.

The general presentation is, to say the least, poor. The cassettes are supplied with brown paper inserts and the instructions are computer printed on a sheet of this brown paper. The instruction sheet states that "Having purchased a computer accounts program it is assumed that the user has some knowledge of both", and you'll certainly need it!

Once the Basic program has loaded a very short page of machine code is then also loaded and the main menu is displayed. There are 10 options available in all of the programs. The first programs which should be used are the cashbook, to enter credits and debits, and the daybook. Option 1 is used to enter new data, simple form fill techniques are used to enter the name, date, reference, amount, cash, bank and sort of each record. The error checking is very limited, and if the amounts entered do not balance the message "Incorrect Entry" is displayed.

Having entered the date, option 2 allows you to search for a particular record by the name, date, or amount. In the Ledger program it simply displays an alphabetical list of all the account names. The search seems to work quite efficiently for a Basic program.

Option 3 allows you to "browse" through the records, using the arrow keys to scroll entries up or down. This option uses the Dragon's display quite well with a simple windowing method. The record currently at the top of the screen can be viewed in full, or edited if required. The editing procedure is rather clumsy, each field is displayed and given a number, the user then enters the field number to be changed, and the whole field is retyped.

Selecting the sort option allows an alphabetical or date sort to be performed on the data. This can take quite a while with a lot of data in the machine. Records can also be printed out in form suitable for your accountant to complete.

One of the best features of the set of programs is that files are transportable across from the daybook and cashbook to the ledger program via the save and load options, which saves a lot of unnecessary typing. As with most of the options, pressing Enter to any prompt will return you to the main menu, useful if you select a particular option by mistake.

A lot of effort has obviously gone into this software, and indeed it seems to have all the facilities necessary to "Computerise" the accounts of a very small business or individual. It seems a shame that the software is spoiled by being so unnecessarily simply to save memory. It is not fair to assume that the user will be familiar with

Fearless Freddie!

Program: Fearless Freddie, Microdeal, 41 Truro Road, St Austell, Cornwall, PL25 5JZ
Price: £1.99

A CONTROVERSIAL game in my house this one. People either seem to love it or hate it — my advice is see it before you buy.

I think it's great, if untidy. The idea of the game is to collect all the objects on a screen avoiding the various monsters — it is *Mario Miner*. Only this game is different from its revered predecessor.

Firstly it has no jump, only left and right. Upwards movement is obtained by getting onto lifts. Secondly, it has no limit on the distance you can fall so long as you don't end up in a cauldron or a fireball!

In many respects in fact it bears more of a similarity to A

& P's *Charlie Egg* (which I am unreluctantly informed, was also designed by Matthew Smith — but no doubt you will correct me if I'm wrong).

The graphics seem to range from the great to the intolerably bad. The screens are all well designed, the features introduced sequentially and neatly, and when you are used to the game there is still level two to play which appears to go on for ever!

The character is an incoherent mess, graphically as are some of the foods and I have already found one bug in the game as well as a couple of design flaws but despite this I still enjoy loading the game up for a quick touch of the daring deed!

 Jason Oxburn

It's time for tea!

Program: Tea-time, Microdeal, 41 Truro Road, St Austell, Cornwall, PL25 5JZ
Price: £1.99

THE STAR of my batch from Pocket Money, this is a good game, programmed better than a lot of those retailing for £8 in Microdeal's main range.

The game, however, does not have enough sophistication to be worth the higher price and so is justifiably placed in this range.

The aim of the game is to control a tea pot which must first catch falling tea drops and then avoid deadly sugar cubes. The game has several shades of *Double Dragon* Castles within it but plays considerably better than them.

There are three screens which repeat in turn, each time being more difficult than the last. They are well designed, excellently laid out, and very challenging.

computers or even accounting to that extent. The instructions are wholly inadequate, even mentioning on about how strings are stored within the Dragon's memory (very interesting to a business user!) when nowhere near enough has been said about the programs themselves.

All this is not to say that the

There is an option to start at any screen and a high score table that keeps the top five sets of those initials in order.

The thing that lifts this game out of the mediocre is its absolutely superb look. It is very neatly laid out, plays all its tunes without obscenely fat notes and has a very clever compartment layout using a sub-screen border technique to great effect.

The game almost gets a five out of five rating but doesn't have that additive quality to give the player the urge to load it up. When it's in, the "one more game" syndrome operates efficiently but it's a matter of the urge to load.

In short then, a good game that handles nicely and looks great.

 Jason Oxburn

software is not useful. If you are prepared to work out how to use the programs largely for yourself, and have a cassette-based system, then this suite of software will serve as an introduction to computer accounting.

 Brian Cudge

The numbers game— part two

Pam D'Arcy has had so much mail about her disassembler for beginners in the June issue that she has had to extend it — this month, how to dump to printers, and loading machine code programs with offsets

HAVING GIVEN you a "disassembler for beginners," thinking that beginners cannot afford printers, the requests are coming in for a printer option — and lots and lots of queries regarding loading machine code programs with offsets.

Print-out option

The screen display is not compiled sequentially so I have taken the screen option for all of us — appendage of a 50 byte TEXT SCREEN DUMP SUB-ROUTINE to the existing code invoked by the "K" key press requiring just 3 bytes of existing code to be amended (by POKEs direct from the keyboard).

Saved as a separate entity, the text screen dump subroutine can be used, once loaded, from other programs and direct from the keyboard (EXEC10210). If used in the later mode, should the screen be full, the top line will be lost because of automatic scrolling following typing in of the EXEC statement.

Amending the assembler using the test loader program

Load the TEST LOADER program and, should you want to cross-check the total checksum of the routine being appended, amend line 40 to read:

```
0017=0: FOR N=10210 TO 10260
```

```
Then type CLEAR 200, 10001
```

Load the existing DISASSEMBLER into memory (at address 10001)

[Enter the new code (Listing 2, DIS-ASSEMBLER HEX DUMP) and R0442 should you want to cross-check the data entry.

From the keyboard, change 3 bytes of the original DISASSEMBLER thus:

```
POKE 10226,20
```

```
POKE 10227,11
```

```
POKE 10228,96
```

(type) OSAYCM "program", 10001, 10260, 10001

(click) SAVE "program", 10001, 10260, 10001

And away you go! A sample of the dump is given covering the changed bytes (Listing 3) — bytes 02FC2 (10226+) and 00000 (10211+).

Amending the program using an assembler

An Assembler source listing is given (Listing 1). Using DSKDREAM, the sequence followed was:

```
CLEAR200,10210  
RUN DSKDREAM.BIN"
```

enter save source, assemble & quit

```
CLEAR200,10001
```

```
LOAD existing disassembler
```

```
POKE 10226,20
```

```
POKE 10227,11
```

```
POKE 10228,96
```

```
SAVE "program", 10001, 10260, 10001
```

(I know 10260 is actually sufficient for "end

address +1" — I am keeping it the same as the hex load amount which includes 2 null bytes for rounding reasons)

Amending the "K" key

Should you wish to change the key to be pressed to give the printer dump, the new key value should be POKE'd into 10220.

```
3060 *  
3060 * SCREEN PRINTER DUMP  
3060 *  
3060  
3060 * ASSEMBLED USING DSKDREAM  
3060 * AFTER CLEAR 200,10210  
3060  
3060  
3060 * commence with CR (automatic LF)  
3060 DUMP LDA #000  
3060 JSR #000F ;Print ROM  
3060 LDX #0400 ;scr.start  
3060  
3060 * convert test screen ("POKE")  
3060 * chars to ASCII for print  
3060 NEXTCH LDA ,X+  
3060 CHPA #07F  
3060 BHI PRINT ;graph,chr  
3060 CHPA #020  
3060 BHI NOTLOW  
3060 CHA #060 ;lowercase  
3060 BNA PRINT  
3060 NOTLOW CHPA #060  
3060 BLD PRINT ;space OK  
3060 ANDA #00F ;non-alpha  
3060  
3060 PRINT JSR #000F  
3060  
3060 * CR(LF) if end of screen line  
3060 TFR LD ;next addr  
3060 ANDB #01F ;prev./32  
3060 BNE CHEND ;not integ  
3060 LDA #000  
3060 JSR #000F  
3060  
3060 *check for end of screen reached  
3060 CHEND CHPX #0400  
3060 BNE NEXTCH  
3060 RTS  
3060
```

DISASSEMBLER HEX DUMP

```
15211 86 8D 8D 88 8F 8E 84 88 A6 88 919
15221 81 7F 22 8C 81 28 22 84 8A 88 737
15231 28 86 81 68 25 82 84 8F 8D 88 942
15241 8F 1F 18 C4 1F 26 85 86 8D 8D 668
15251 88 8F 8C 86 88 26 D9 39 88 88 681
```

OVERALL CHECKSUM TOTAL 3867

The values are listed in the Dragon manual (pp. 136-137). "8888" still may be the normal values. Byte 15250 currently contains 75 (K). To change it to, say 7F F088 15250.80

Loading machine code programs with offset

This facility enables relocatable machine code to be positioned elsewhere in memory. Loading from cassette with offset (=value to be added to the LOAD and EXEC address) is described on p. 135 of the manual. Note that DCRH loading with the optional parameter is DIFFERENT (and easier) from tape loading.

To take Belgian reader Maarten Van Wamelien's enquiry: "Do you know a way to put a machine code program higher in memory, say the disassembler at address 28000?"

1) Calculate the offset=required load address - current load address = 28000 - 12001 = 15999

2) CLEAR 280,28000

3) CLOADM "program", 15999

4) The address that a program is saved from becomes its 'normal' load address. Should it be preferable to normally load the disassembler at this address, save it as:

CSAVEM "newname", 28000,32250,28000
Subsequent CLOADM's without offset will load this version at 28000 (as mentioned in the article, some identification of load address as part of the program name is a great idea indeed — eg. DIS28000).

Should you have completely forgotten a tape program's load address and do not possess a disassembler catalogue program, CLOADM's then from the keyboard enter: PRINT PERK (1267258+PERK (158))
PRINT PERK (1267258+PERK (127))

The former gives you the EXEC address of the newly loaded machine code program which — unless you are unlucky! — will also be the LOAD address. The latter gives you the END ADDRESS+1 occupied by the program just loaded.

Loading machine code programs at a lower address in memory

DRAC will not allow you to include a three sign with the offset (FC error results), so we are forced to "cheat" the system using the "magic" number 65535. Example: load the disassembler at 12000 instead of 12001:

1) Take 65535, subject from it the 'normal' load address, add to the result the required

load address = required offset = 65535 - 12001 = 53535 + 12000 = 65535

2) CLEAR 280,15999

3) CLOADM "program", 65535

4) Again, the program may be saved from this position to become a version with this as the 'normal' load address: CSAVEM "newname", 12000, 12155, 12000

Why two dump listings rather than source code?

Perhaps the Editor ought to provide this one, but Maarten also asks why there is such a proliferation of number dumps when readers are keen to practise with their Assemblers? Suffice to say that it took me three attempts to get the disassembler article short enough to be accepted in the first place and the source listing is 12 pages long...!!

Sample dump taken using amended program

ADDRESS	INSTRUCTION	DATA	Amended instruction
02FC2	17868a	LGSR	LABEL → Amended instruction
02FC5	288A	BRA	028A8 LABEL
02FC7	8188	CHPA	02FD1 LABEL
02FC9	2686	BNE	02888 LABEL
02FCB	8C8CAF	LDS	02FD1 LABEL,PCB
02FCE	ED8CB4	STD	02F7D LABEL,PCB
02FD1	17FF34	LGSR	02F85 LABEL
02FD4	8C8C8E	LDS	02F88 LABEL,PCB
038A8	8A8D	LDA	028D0
038AD	8D888F	JBR	0288F ea
038B8	8E8488	LDX	028488
03873	A688	LDA	,X+
03875	817F	CHPA	0287F LABEL
03877	228E	BHI	028D7 LABEL
03879	8128	CHPA	02828
0387B	2284	BHI	02881 LABEL
0387D	8A68	ORA	02868
0387F	2886	BRA	02887 LABEL
03881	8168	CHPA	02868
03883	2582	BOS	LABEL
03885	848F	ANDA	0288F
03887	8D888F	JBR	0288F ea
03889	1F18	TFR	,D
0388C	C41F	ANDB	0281F LABEL
0388E	2685	BNE	02875 LABEL
03898	868D	LDA	028D0
03892	8D888F	JBR	0288F ea
03895	8C8488	CHPX	028488
03898	26D9	BNE	LABEL
0389A	39	RTS	02875

MIKE GERHARDS ADVENTURE TRAIL

"FIGURE" showcasing the lack of new Dragon adventures over the usually quiet summer months, then Don't Panic! The Scott Adams adventures from Adventure International are said to be almost ready, though it's getting to the stage where I'll believe them when I see them. Meanwhile, I've been looking at an old title from Peacock called . . . Don't Panic. I picked this up from Peacock proprietor Harry Whitehouse at the second 6809 show, where the two-adventure tape was on sale for a very reasonable £2.50. Harry was very modest about the contents, describing them as old-fashioned text adventures, but as they were unfamiliar to me I thought I'd give them the once-over and I'm glad I did.

Both adventures load together and you're asked at the start if you'd like to tackle *Towers of Death* or *The Ice Kingdom*. While it might appear from that that each of these is only half-an-adventure in size, they do take up about 24K, of memory altogether, and of course much of the actual core program is the same for both, avoiding duplication.

The *Ice Kingdom* sends you in search of the *Time of Understanding*, which lies somewhere to the east of the Black Mountains, and that's all you're told about the *Time*. You start in your own village, with nothing at all to aid you. The location description, visible objects and obvious exits are all stated at the top of the screen, with your "What Now?" prompt beneath.

I wandered through some leafy paths and dark woods (more smart economy, as some of these appear in both adventures): till I found a preacher's hat and our old friend the axe. Also some bees and flowers. Then I went up into the mountains to find an even older friend, the bear in the cave, and no prizes for guessing what he wanted. Unfortunately as I was just about to go past him, the program crashed with a syntax error. I must stress that this was due to some garbled data on my copy of the tape, and not to a fault in the program itself, as I'm sure Peacock will quickly replace it.

Towers of Death worked perfectly, and allowed me to see that there are quite a lot of locations and interesting problems tackled away in these two titles.

This second one begins: "There is an old legend which states: 'When the Sage-Man of Alexander enters the Obsidian

Towers, the evil curse will be lifted.' Your mentor has sent you to find the old sage of the woods and to test the legend!"

It didn't take me long to find the old sage, though he didn't have any old onions with him, and he gives you some helpful advice which it's best not to follow straight away. Make sure you've explored every rock and cranny first. In the 11 plains, desert, mountains and crags of the initial batch of locations, I quickly found also the large gates marking the Obsidian Towers, but as there was rather a nasty sound coming from behind them and I didn't think I was quite equipped to deal with it yet, I left them alone.



The text in these two adventures is very brief, and the word recognition and other features are fairly primitive, as Peacock admits, but nevertheless for £2.50 the pair they're worth having if you haven't seen them and are desperate for adventure.

Even if you are desperate I wouldn't recommend this month's only new title, *Escape from Hell House* from Litra Software. This comes with a version of *Invaders* on the other side, and to get that out of the way it is very crude and slow, with poor collision detection, poor response from the laser base to movement key/joystick, and finally you can't actually fire when your base is moving.

On to the adventure, for what it's worth. The scenario is summed up very easily: "You are trapped in Hell House. The House has three floors with four rooms on each floor. You must solve the problems of escape." On each of the three levels, then, there are rooms to north, south, east and west of you, with each move you make using up 10 of your 350 energy units. There is some food in one of the rooms, and this adds to your energy level when eaten. There are 14 commands available to you through single letter inputs, plus movement commands, so 'P' for instance means 'Pick it up', while 'M' means 'Use the magnet', which does tend to give part of the game away.

There's an instant death routine on each floor, cunningly enough each being accompanied by a spelling mistake: to save he got you, he asks for the pass word and wory that did no good your dead. This gives you some indication of the level of the game, which is pretty low, and pretty brutal.

But on to brighter things, and readers' letters. It's obvious that many of you are stuck in Madness and the Minotaur, judging by the requests I've had for hint sheets, and those should all have reached you by now. One went to Tim Luce of The Cottage, Tabern, London Road, Brighton BN1 6CA, who in addition is having trouble with a game called *Quest*, from Oregon Data (ODP). This is a new one to me, but Tim's problem is not at all trivial and treasure but of "TRO Error in 6700" just as he's getting towards the end of the game. If anyone else has come across that and found the correction needed then can you let Tim know?

Tony Barker of 71 Crown Road, Epping, Essex CH16 6DH asks for text adventures with lots of cats and gobins to fight, as he prefers the Fighting Fantasy style to straightforward adventuring. I've recommended *Monsters and Magic* from Touchmaster at £3.95, *Secret and the Sorcerer* (£3.95, Moby Computer Games) and is a lesser effort *Alas of the Wizard* (£5.00, Microdeal). This isn't really my type of game, though, so if anyone's any better suggestions why not write to Tony direct.

Someone offering and asking for help is Tim Urein, 11 Merle Avenue, Keworth, Leicestershire CV8 1EU. Tim can give help with *King of Darkness*, *Towers of Death* and *Rescue 1*, and in return needs help

on *Treasure II*, *Sutty*, *Madness* and the *Minotaur* and *Return of the Ring*. Tim is also trying to get hold of cassettes of *Treasure Island* and *Crystal Castle* from *Dragon* Software, if anyone can help him there.

The dreaded *El Cadien* turns up yet again, with *Howard* (Biltington) asking for help in five different places:

- 1) How to get past the man with the machete after gazing at the yellow pool.
- 2) Where to dip the stick.
- 3) Where to find the desert bewties.
- 4) What's the significance of the lizard, snake and crow.
- 5) How to turn into an animal.

Howard's address for help on these is *Howards*, 14 Ralston Avenue, Salsford, Huddersfield HD3 2JJ. Also in need of (slightly) help is *Stephen Cogge* of 604 King Lane, Leeds LS17 7AA, who's looking for an eagle and some magic beads.

Andrew Bell of Mill Cottage, Little Carlton, Lough, Lincsophire LN11 5HP, is an example of how not to write a letter! Andrew is stuck in *Black Sanctum*, and asks me how he can beat it. I've written back to Andrew trying to help him, but it's very difficult to answer a general question like that, when you don't know if the player's stuck at the first problem, the last problem, or anywhere in between. Please ask specific questions where you can, and I'll do my best to answer them or put you in touch with another reader who can...

Someone kindly offering help on the first two parts of *The Red Trilogy* is Matthew

Lodge, "Maze Master", Holmes: Chapel Road, Lach Dennis, Northwich, Cheshire CW9 7SD. Matthew managed to find a bug in *The Mountains of Ar* which allowed him to score 100 per cent in solving this part. Unfortunately you only get the code word if you score exactly 100 per cent, so Matthew had to go back and do it properly. What Matthew discovered is that when you've traded the Goblin Gazette for gold from the goblin who is bored, you can change the gold for 50 coins, then go back to re-buy the Gazette for two coins, give it straight back for more gold, and then go on doing this until, as he says, you get fed up of it.

Malcolm (Shazell), 294 Daffish Road, Kefham, Plymouth PL2 0DQ, needs help on *Castle Blackstar*, another title I'm not familiar with, so if anyone out there is playing or has played it, perhaps you'd get in touch with Malcolm. Richard Cornish of

New House Farm, Tytkington, Wotton-under-Edge, Glos GL12 8QB, has lost his original instruction book for *Madness* and the *Minotaur*, and wonders if anyone can spare him one?

Finally those clues promised last month on *The Circlewood* incident, courtesy of Paul Watson, so if you don't want to know about them then stop reading here.

Still with us? Right, then to begin with you must catch the bus to the DHSS and sign on, go east to the Garden Centre to buy some shrubs, then to the Sains to get an iron bar. This you use in the Cheese Shop to hit the Greek in order to get a map, and then you buy a trust and some travel sickness pills in the chemist.

That's as far as I'll take it this month, so with my travel sickness pills and my trusty bus in my hand, I'll leave you and march off towards next month's column.

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If you've got a technical question write to Brian Cooke. Please do not send a SASE as Brian cannot guarantee to answer individual inquiries.

Dragon Answers

Stylograph

I USE a Dragon 32 C28 system with double disk drive and a Tandy Daisy Wheel 18 printer with internal Dotsm 158 printer buffer.

Everything works together very efficiently except that I'm unable to access the pound sign on the Tandy printerhead when using the Stylograph word-processing program. The printerhead is a Ricoh compatible 134 character affair with a hash accessed by Hex 3 and the pound sign accessed by Hex A3.

I can send Hex A3 to the printer, making it print a pound sign, via the C28 operating system using the "display" command, but Stylograph seems to suppress code A3 when I try to send it using a printer control character defined by the "JC" command. I get a hash instead of a pound sign! I've also tried to persuade Stylograph to recognise Hex A3 by using Stylx, but again to no avail.

David Taylor
27 Addison Road
Wimbledon
London SW19 2AG

THE PROBLEM with Stylograph seems to be that it will only allow 1 bit for characters, the eighth bit being used to signal style control codes perhaps. The published method of redefining the printer character codes, by adding the STYPE file, will not work for codes over 127 decimal.

Unfortunately, I have not been able to find a way of overcoming this problem from within Stylograph. Perhaps one of our readers knows of a solution?

OS Error

I AM using my Dragon 32 to produce story outlines, like computer lessons and the like for my remedial pupils. I cannot get more than 255 characters in to the machine before I get an "OS ERROR" message, even though I am using different strings. I know I can only get 255 in one string; but why only 255 altogether? The handbook is no help. It says use "CLEAR" but I lose it, of course.

Brian Jefferson
Bromesme School
Coppinham View
Dorington SO3 9SR



YOU ARE correct in thinking that any one string can only store up to 255 characters. However, the overall number of characters allowed for all strings has to be set by the user — this is known as "String Space".

On power up the Dragon gives you 256 bytes or characters of string space, so even if you use different strings, the total number of characters that can be stored before an OS ERROR occurs is only 256.

The CLEAR command is used to change this. For example, to give you 5000 characters of string space you need to add line 5 CLEAR 5000.

Sound signals

I'VE HAD lots of problems with the sound in my Dragon 32. In fact I knew that the computer works perfectly, so it seems that the fault is on the TV, which is a Hitachi make and produced in Greece. But I've also tried the Dragon on a German TV, SABA make but I've had the same problems. I wonder if you could advise me on that, because I do get a perfect display.

John Mandrake
13 Argyleville Street
Ayrshire
GRI 115 2J Ayrshire
Greece

THE FIRST thing to check is whether you have a sound signal at pin 1 of the monitor socket. If not, then the problem lies somewhere in the sound generation circuit, which could be any one of a number of components. If you get sound at the monitor socket, but not through the TV, then it is probably the Modulator which needs replacing.

Audio On

I HAVE come across two problems while doing machine code.

How is it possible to access Audio On and Audio Off from machine code?

Is there a machine code routine somewhere to access a header-less program? If so where and how could it be used from assembly code?

Paul Burgin
18 Moorcroft Road
Purfleet
Dorchester DT9 4DG

THE AUDIO ON and OFF commands can be accessed by the following routines in machine code:
AUDIO ON 43552 (Dragon) 4 43421 (Tandy) (T=8)
AUDIO OFF 43551 (Dragon) 4 43358 (Tandy)

To load a Basic program whose header has been corrupted, position the tape immediately after the header, and type:

MOTOR ON: LOAD 000710
the program will then load, and can be re-saved correctly.

Division?

I HAVE been trying to learn machine code but despite reading three books on the subject, I have been unable to find out how to perform division (except by trial or how to handle fractions (such as eight occur during division).

Can you explain how to do this or point me in the direction of some more information literature.

J. Rattenman
14 Althorpe Way
Ayleston

I SUGGEST you get a copy of *8088 Machine Code Programming* by David Barton, published by Granada. This book

refers to the Dragon, and has a section on multiplication and division, explaining clearly the principles involved. Two programs are listed, one for 8 bit and one for 16 bit division.

Circles

AT THE moment I am trying to write a program to draw a pie chart. However, I am having difficulty in drawing the lines from the centre to the appropriate position on the circle. Please could you explain how to do this.

Tony Chapman
Dunthorpe
Lincs

THE FOLLOWING Basic program can be used to produce pie charts. It can be expanded to produce different colours and such. The values of ST and EN should be the Start and End positions of the segment to be drawn, as used by the Basic CIRCLE command.

```
50 DEF FN(X)=3.14159*28/360  
(X-8.25)/5.24  
60 DEF FNT(X)=88-36  
(X-8.25)/5.24  
200 ST=8:EN=8  
210 CIRCLE(128,96), 50  
_1,ST,EN  
220 LINE (128,96)-(FNT(ST),  
FNT(ST),FNT  
230 LINE (128,96)-(FNT(EN),  
FNT(EN),FNT  
9999 GOTO 9999
```

Fast mode

COULD YOU tell me how to load a program from cassette which was saved accidentally in a faster speed (actually Peter 65495 B). The program was extremely long and took many hours to type in. Was this load?

Tommy Martin

PROGRAMS which have been saved whilst in the fast mode cannot be loaded back whilst in this mode. The Dragon must be put in to the highest speed mode available, which also has the effect of losing the screen display.

Use the following commands to load your program back in:
AUDIO ON:POKE 65497:CLCLR
The Audio On is so that you can hear the program loading, as you will not be able to see anything on the screen. Once loaded press the RESET button and by hitting the program, if it has loaded correctly then save it at the normal speed.

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Competition Corner

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Gordon Lee with another mathematical conundrum — 15 copies of Chuckie Egg and Screaming Abadda from A'n'F software to be won.

increased by a factor of slightly more than three. Thus the average result over a number of steps will be in the order of $3N/2$ — in other words, the number will gradually increase without limit — a fact which we know by experiment to be wrong!

The fallacy in the argument is fairly easy to spot. When an odd number increases by a factor of $3N+1$, it must become an even number, and so will immediately be halved at the next step. So an odd number has a net gain of only $1/2N$ (plus a tiny bit more), and if this is now averaged with the factor of $3/2$ in the case of even numbers, the overall result will be a decrease of about 0.7% per step — a figure which approximates roughly to that obtained by actual experiment.

The third possibility that was mentioned last month concerned the endless loop that would occur if a number was reached that had already occurred during the calculation. This is a distinct possibility, and again, there is no definite proof either one way or the other. As has been stated, actual experiment argues against such a

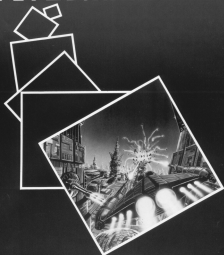
set of numbers, but, who knows? Somewhere in the vast infinite expanse of integers there may be such a set of numbers that will form an endless loop. So far, though, they have eluded detection. Maybe some keen 'Dragon User' will find one!

It may be thought that one way to understand the problem is to study it in reverse. That is, begin with 1 and trace each subsequent number backwards. Unfortunately, this brings with it certain problems. Given any of the back divides into two branches. For example, 11 can only lead on to 22, but 22 can branch to either 44 or to 7. Algebraically, any number of the form $6Z+4$, where Z is any positive whole number, will divide in this way. It is not difficult to realise that these ramifications will soon become very diverse. The accompanying diagram shows the start of such a tree, containing just a few selected values. If the theory that all integers finally reduce to 1 is true, then this diagram will have to extend outward to infinity. Also, every conceivable positive integer that exists will be found once, and once only, in its own unique position on such a tree.

For the competition this month, consider the 351 digit number $10^{351}+1$. That is, 1 followed by 349 zeros, followed by 1. If you were to start with this number, can you determine how many steps would be needed in order to reduce it down to 1?



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